



A Corporate Publication of Santee Cooper

POWERSOURCE

Spring 2012

From the CEO

Future customers of Santee Cooper may well look back on this period as a turning point for Santee Cooper and South Carolina.

As you may know, the Nuclear Regulatory Commission recently approved combined construction and operating licenses to Santee Cooper and South Carolina Electric & Gas Co. for two new nuclear power units at the V.C. Summer Nuclear Station.

This is a significant milestone for V.C. Summer, for Santee Cooper and for our state. These new nuclear units are a critical component of Santee Cooper's long-term plan to diversify our generation mix and continue to provide our customers with low-cost, reliable and environmentally protective electricity. They will be key to job creation and economic development opportunities as we continue rebuilding our state's economy and position South Carolina for the future.



Nuclear power is the only base-load source of generation that is virtually emissions-free, and its long-term operating costs are less than those of fossil-fueled generation. As regulations continue to drive up the cost of fossil-

fueled generation, the importance of having a diversified fuel mix cannot be overstated.

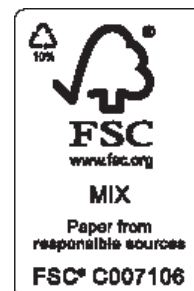
The NRC has given our application an intense review, and I applaud the commissioners for their diligence. We are only the second new nuclear power project approved under a new, streamlined permitting process.

We have chosen Westinghouse's AP1000 units, each with a capacity of 1,117 megawatts. Project employment will peak at about 3,000 long-term construction workers over the course of three to four years, with the addition of 600 to 800 permanent jobs when the units start generating electricity. We anticipate Unit 2 will come online five years from COL receipt and Unit 3 about 14 months after that.

This project is in excellent hands with SCE&G serving as majority partner. Santee Cooper retains a 45 percent ownership in Summer Unit 2 and Unit 3, and our negotiations continue with several utilities to sell a part of that interest to better match our future capacity with the slower growth brought on by the Great Recession.

As a state-owned power utility, Santee Cooper has responsibilities to be a leading resource for improving the quality of life for all South Carolinians. This important step helps us fulfill those responsibilities.

Lonnie N. Carter
President and Chief Executive Officer



Willard Strong — Editor

Jim Huff — Photo Editor/Photographer

Mollie Gore — Writer

Phil Fail — Writer

Nicole A. Aiello — Writer

Tom Galmarini — Designer

Spring 2012— Vol. 12, No. 2

PowerSource is published by Santee

Cooper Corporate Communications.

Use of materials is not authorized without permission of the editor.

Address all correspondence to:

Corporate Communications,

Santee Cooper

1 Riverwood Drive

Moncks Corner, SC 29461-2901

Phone: 843-761-7093

e-mail: mollie.gore@santeecooper.com

feature

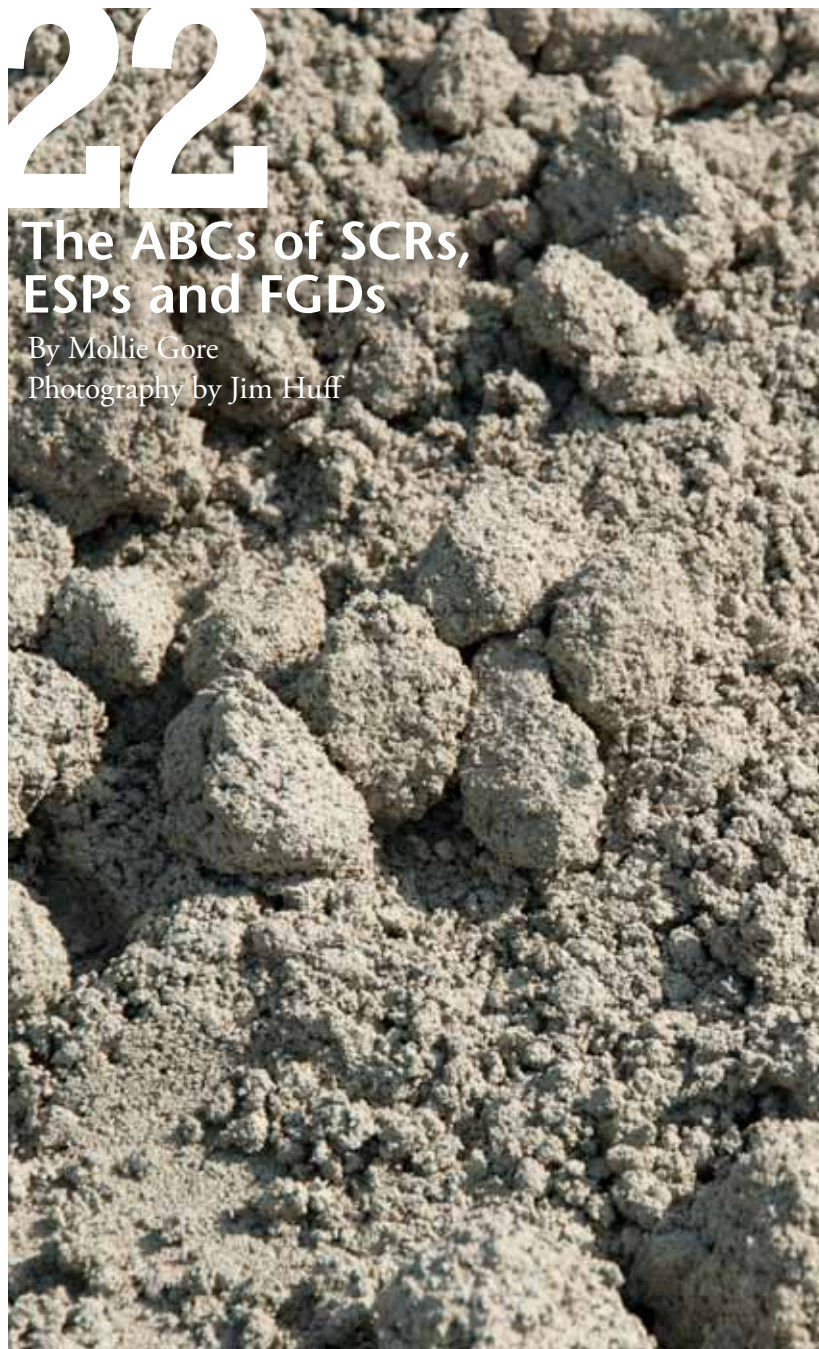
22

The ABCs of SCRs, ESPs and FGDs

By Mollie Gore

Photography by Jim Huff

I
N
T
H
I
S
I
S
S
U
E



About the cover: These steel balls are used in “ball mills” at Santee Cooper’s Cross Generating Station to crush limestone combined with water that creates a slurry for the flue-gas desulfurization process. The different ball sizes equate to wear over various periods of use.



4 New Navigation Markers and Fish Passage

By Willard Strong

Photography by Jim Huff

12 ITAP Takes Flight

By Nicole A. Aiello

Photography by Jim Huff

18 Reduce the Use Energy Monitor

By Phil Fail

34 NewSource



Navigating Cooper River's west branch aided by new channel markers

by Willard Strong

photos by Jim Huff

*“Come on the risin’ wind
We’re goin’ up around the bend”*

chorus to “Up Around the Bend”

Creedence Clearwater Revival

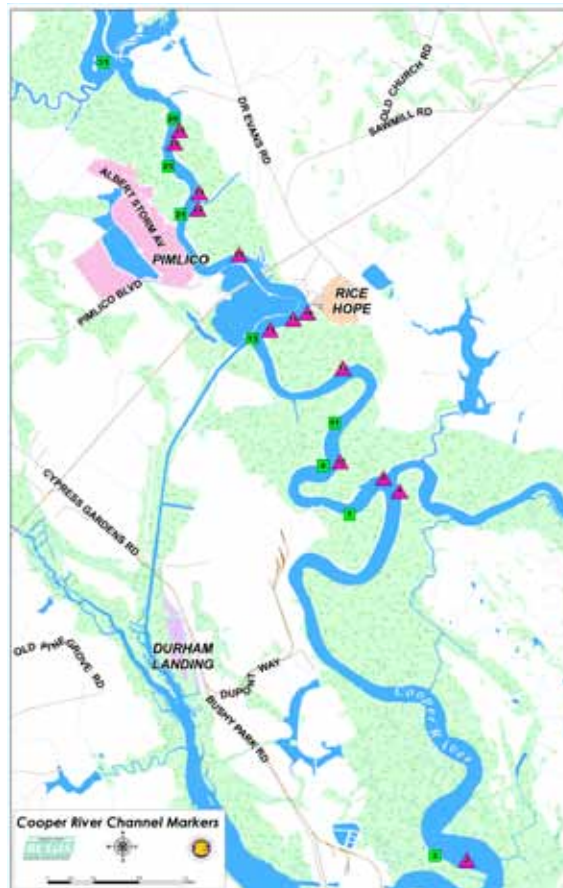




When John Fogerty penned and sang the words to that song 42 years ago, it isn't likely he was thinking about navigating the sometimes tricky upper reaches of the Cooper River.

With its bends and curves, sandbars and rice fields, all subject to a sometimes swift tidal current and fluctuations, boaters will be pleased to discover that navigating the river is much enhanced in 2012.

That's because the Cooper River Navigation Aids Project was completed late last fall. It's a case study that shows what cooperation among state and local governments can do for the public good.



In particular, the project provides:

- Improved safety through channel markers
- Increased recreational opportunities on a river that is, depending on your direction, the gateway to the Santee Cooper Lakes or the gateway to Charleston Harbor.

“The original 14 markers have been refitted and/or replaced and eight new markers installed,” says Santee Cooper Economic Development Facilities Planner Barry Jurs. “These 22 markers are highly visible.”

Jurs says credit for the project goes to a lot of agencies and people who forged a productive partnership.

In addition to Santee Cooper, big players in the project included the Berkeley County Legislative Delegation, the Berkeley Soil and Water Conservation District, Berkeley County government, and the S.C. Department of Natural Resources (DNR).



“A good example of this cooperative spirit that was critical to our project was Col. Alvin Taylor at the DNR,” says Jurs. “He’s from this area, knew the value of the project and was very helpful in this process.”

Says Jurs, “He helped us get our previous permit for the markers modified. Permitting can often be time consuming and even frustrating. And as many now know, he’s no longer just Col. Taylor. He’s DNR’s new executive director. We’re excited for Berkeley County and the Lowcountry because of his background locally, and we’re looking forward to working with him in his new role as he moves DNR forward.”

Key advocates from other areas quickly stepped up too, recognizing the need and monitoring the project along the way.

“Working with Santee Cooper and DNR we were able to identify the needed locations of markers to prevent confusion for boat users up and down the river,” says Lt. Gov. Glenn McConnell. McConnell enjoys spending leisure time on the water at Lake Moultrie, and he recognizes the public need for safe passage up the river from Charleston.

“Together, we were able to work with the Coast Guard to get quick approval by documenting all needed locations and forwarding the details of what was proposed,” McConnell says.

“The markers will reduce the number of rescues from the rice fields and cut down on DNR’s use of resources to answer calls,” he stresses. “The general public will be safer on the river and the markers will promote the use of the river, thereby

Santee Cooper’s barge, the Gator Sue II, gets in position to go through the uplifted CSX railroad trestle that crosses the Cooper River at Strawberry Trestle. The barge was returning to its moorage on Lake Marion in February and was on its way to the Pinopolis Lock after doing transmission line work on the Waccamaw River. The barge has been used to install and maintain the navigation markers.



David McClary, Santee Cooper's supervisor of construction services, oversaw the installation of the original and newer navigation markers.

helping recreational use as well as enhancing the economic benefits to commerce from the public's presence."

Berkeley Sen. Larry Grooms, who grew up in St. Stephen and around Lake Moultrie and the Cooper River, was also very supportive of the project.

"For those unfamiliar with its twists and turns, the Cooper River can pose many hazards," says Grooms, a Bonneau resident. "The Berkeley delegation was pleased to be a part of the team helping to restore and improve these navigational markers."

River is hurricane evacuation route

One important dividend that will likely be reaped from better Cooper River navigation is the ability for mariners to quickly seek safe harbor leaving Charleston from the Lowcountry's chronic hurricane threat.

"When hurricanes threaten the Charleston area, boats, particularly sailboats, make their way up the Cooper River to get away from the storm," says Troy Diel, chairman of the Berkeley Soil and Water Conservation District.

Diel is also director of the Old Santee Canal Park in Moncks Corner, owned and operated by Santee Cooper. The park and its expansive floating dock is where, going upstream, the west branch of the Cooper River ends and the four-mile long Tailrace Canal begins. The canal ends at the base of Santee Cooper's Jefferies Hydroelectric Station, where the 75-foot Pinopolis Lock provides a gateway to Lake Moultrie.

The river can lull boaters into a false sense of security. That's because the tidal variation can be as much as 6 feet at critical navigational points.

"When the tide is high, smaller boats and those up to say, 22 feet, can get away with not following the river bed, the deepest part of the Cooper River and where you want to be," Jurs says. "A boater who may have not followed the 'right' path at high tide believes there won't be a problem at low tide, but there can be. So, he comes along and it's low tide and he's

stuck on a sandbar or a rice field and, of course, wonders why because everything was fine the last trip.”

Many watercraft utilize the lock or the Tailrace Canal as suitable anchorage to ride out the storm. But an underreported aftermath of South Carolina’s worst natural disaster, 1989’s Hurricane Hugo, was that in the haste to flee the Charleston area, those not used to navigating the Cooper River ended up in trouble.

“So many people were not familiar with the river,” says Jurs. “It was not well marked. In the days leading up to Hugo striking on the night of Sept. 21, 1989, I know of at least one unlucky boater who spent a very uncomfortable night on a rice field with the wind blowing very hard.”

Fortunately, no lives were lost during this episode. Subsequent hurricane and tropical storm threats also sent Charleston boaters scurrying to set sail for Berkeley County.

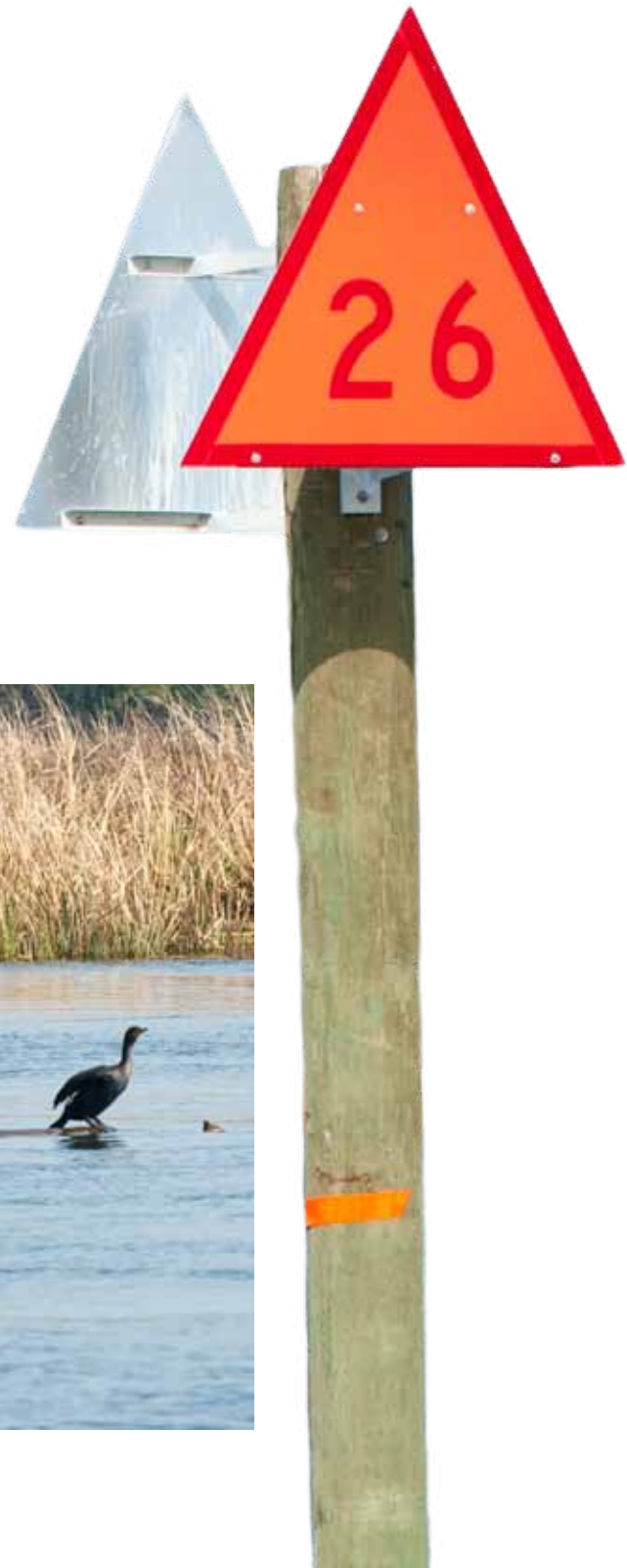
“These storms are just another example of why adequate navigational aids are needed,” says Diel. “I’ve lived around here all my life and I, too, have had an occasion to misjudge the river. Even for an experienced person like me, it can happen.”

Getting the project done

The total cost of the project was approximately \$100,000. The Berkeley delegation secured water recreation funds from DNR. Berkeley County government provided support and has inspected the original markers since they were installed.

Santee Cooper enlisted the help of its Gator Sue II barge for marker installation. David McClary, Santee Cooper’s supervisor of construction services, headed up the project on the water.

All types of waterfowl can be found along the Cooper River.



River supports recreational business

During the boating season, you'll find anglers and personal watercraft plying the Cooper River. It's also quite common to see dive flags and bubbles near anchored boats.

Scuba divers are looking for treasure at the murky river bottom, a practice that has gone on for decades. Tom McMillan, a boat captain and diver, is one example.

He has a weekend business, taking charter trips on his 22-foot boat twice daily in search of prized shark's teeth that are millions of years old. With proper permits and required certification, he routinely dives

in waters 40-feet deep searching for quarry from long extinct creatures. "Lying in the gravel beds, churned by the ever-constant flow of the river, are fossilized shark's teeth from many ancient species," says McMillan, who has over 30 years of experience on the river.

Says McMillan, "The most notorious of these is the extinct *Carcharodon megalodon*. It's a species from the Miocene to Pleistocene eras whose exact dimensions have long been disputed. But *megalodon* was big by anyone's standards. Samples of its teeth very often are the size of an adult hand and have been retrieved in large numbers over the years. Bringing back a 'big one' is the ultimate quest for rookies and pros alike."

It's the rookies on the river, whether boaters or divers, that McMillan worries about. He's heartened to hear that navigation has been improved.

Maintaining navigation markers along the Cooper River involves the cooperation of county, state and federal agencies.



“It’s pretty difficult for someone who’s not navigated the river before,” says McMillan. “They either drive into a sandbar or into a rice field. The river is very deceiving. A couple of sandbars below the ‘T’ are particularly tricky. I was here for Hugo and I know what happened then.”

The “T” is where the river divides into the east and west branches. The west branch is the well-traveled waterway, ending at the Pinopolis Lock. In addition to the Old Santee Canal Park, the west branch features such landmarks as the Pimlico subdivision, Mepkin Abbey and Colonial-era homes such as Mulberry and Lewisfield plantations.

A common entre to this area is the boat landing at Durham Creek, just off the river. It’s also known as the Cypress Gardens boat landing and is very popular on weekends during the warmer months.

“Decades before America was formed, this river was the highway of progress, for commerce and recreation,” says Jurs. “It’s gratifying that the ‘highway’ is better than ever.” **PS**

The Pinopolis Lock at Santee Cooper’s Jefferies Hydroelectric Station, lifts or lowers watercraft 75 feet to and from Lake Moultrie and the Tailrace Canal .

The Pinopolis Lock aids boaters...and fish!


Like the navigation markers on the Cooper River, Santee Cooper’s Pinopolis Lock at the Jefferies Hydroelectric Station is a vital cog in making the lakes more accessible to the Charleston area and the Charleston area more accessible to the lakes.

Sixty feet wide and 180 feet long, it lowers or raises watercraft 75 feet to and from Lake Moultrie, the Tailrace Canal and west branch of the Cooper. It is not uncommon in July, the height of the boating season, for the lock to conduct over 300 lock operations during that month, sunup to sundown, weather permitting. The unique experience takes about 25 to 30 minutes.

But what many don’t know is that in addition to lifting boats, the 71-year-old lock lifts migrating fish during the spring from the Tailrace Canal to Lake Moultrie. For example, early this past February at the request of the S.C. Department of Natural Resources, Santee Cooper began operating the lock six times daily. The lifts typically run through the end of April each year, primarily benefiting shad and herring.

It’s another example of how hydroelectric power can assist Mother Nature in an eons-old natural process.





ITAP Takes Flight

by Nicole A. Aiello
photography by Jim Huff

The Myrtle Beach area may soon be more than just a hot spot for tourism and a hot bed for hospitality-related jobs.



Brad Lofton, president and CEO of the Myrtle Beach Regional Economic and Development Corp., emphasizes that aviation and technology industries would help diversify the Myrtle Beach area's economy, which is mainly dependent on tourism.



“It’s very rare these days to have a major airport with so much undeveloped land contiguous to it,” said Brad Lofton, president and CEO of the Myrtle Beach Regional Economic and Development Corp. (MBREDC), one of the leading organizations actively marketing ITAP. “That fact alone is appealing to aviation and technology industries. It opens up opportunities for Horry County that aren’t available in other places.”

Lofton also pointed out several other factors that make ITAP an ideal site for companies to consider, including the Myrtle Beach International Airport’s terminal expansion project and its 9,500 foot runway, which is one of the longest runways in the country. A

Public and private entities have been working in tandem to bring year-round industry and higher paying jobs to the Myrtle Beach area, and one of the primary projects is ready for takeoff.

The International Technology and Aerospace Park, also known as ITAP, is a new 460-acre industrial park operated by the Horry County Department of Airports. ITAP is located on the Myrtle Beach International Airport’s property, which is owned by Horry County. Although numerous other qualities make this site desirable, the fact that there’s a large parcel of undeveloped land adjacent to the airport makes ITAP a rare gem.

Community leaders are polishing this gem and believe it has the potential of turning Horry County into the East Coast’s hub for the high-tech and aviation industries.

runway of that length is noteworthy and allows for opportunities not available at other locations.

In addition, ITAP boasts advanced infrastructure and a state-of-the-art land plan to maximize productivity and innovation. ITAP also neighbors The Market Common, an upscale, urban village with potential of its own, and is less than a mile from what most people consider the Grand Strand’s greatest asset – the beach – which brings with it a unique and high quality of life.

All of these factors make ITAP an ideal location where industries relatively new to Horry County have the opportunity to take flight. That’s good news for an economy that is largely dependent on only one industry, tourism.

Although tourism will remain the lifeblood of the area’s economy, according to officials in the business of creating business in the area, there’s plenty of room for new players.



As a partner in the project, Santee Cooper energized ITAP. The lights are on and ready for business.

“The hospitality industry remains vital to the Grand Strand, but it is finicky and dependent on sunny weather reports and visitors’ budgets,” said Lofton. “ITAP is important to the economic welfare of the area because it diversifies the economy, allows for more growth and will bring year-round jobs and year-round industry to Horry County.”

Lofton said the ITAP project alone has the potential of creating 5,000 new, high-paying jobs in the Myrtle Beach area, an important feat considering some of the area’s statistics. According to Lofton, the Myrtle Beach area currently has one of the lowest average wages in the country of any metropolitan community with more than 70,000 people in the existing workforce.

Diversification with new industries, therefore, is key. And with South Carolina moving toward bringing more aviation and high-tech companies into the state, the time is right for Horry County to court those same industries, and the benefits of ITAP will easily reach well beyond county limits.



“The aviation industry is important to the state,” said Mike La Pier, director of Airports at the Myrtle Beach International Airport. “The state has shown a strong initiative toward growing and expanding the aviation industry in South Carolina, and the presence of Boeing elevates the presence of the aviation industry in the state.”

Boeing is a big name in the aviation industry, but South Carolina is home to many other companies in the industry the general public may not be as familiar with including Lockheed Martin, General Electric Aviation, AVCraft and Honeywell. The technology industry has also been a priority and Google’s Data Center in Berkeley County is one of the newest additions in that sector.

Now, the ITAP project is bringing Horry County to the forefront and is a step closer in making those 5,000 jobs a

reality. The Myrtle Beach International Airport has completed the first phase of the industrial park, the infrastructure connecting the park to The Market Common. La Pier says they are ready for phase two, which includes an additional road network and taxiways to the airport. Even though there's still work to be done, La Pier says they are ready to start signing clients at any time.

The airport and MBREDC is working hard to make that happen. They don't do it alone, though. The key to the success of ITAP lies in what La Pier and Lofton believe is its greatest asset – strong partnerships.

"ITAP is like a puzzle," La Pier explains. "No one part of the puzzle can be successful if the other parts are missing. We can't accomplish what we as individual businesses, as an industry or as a community need and want without successful partnerships."

Santee Cooper is one of those partners. Along with the Myrtle Beach International Airport, Horry County, MBREDC, the city of Myrtle Beach, the Myrtle Beach Air Force Base Redevelopment Authority, the South Carolina Power Team and many others, Santee Cooper has been a piece of the puzzle instrumental in making ITAP a reality.

According to Sam Bennett, Santee Cooper's manager of economic development, the ITAP project has been a labor of love for the organizations working to stimulate additional economic growth and development along the Grand Strand.

"ITAP is a true partnership between public and private entities," Bennett said. "All of our partners have been tremendous. This is a great example of what can happen when everyone's working together."

Santee Cooper's role in the ITAP project is diverse. From acquiring the

certifications needed to develop the site to constructing the electrical infrastructure, Santee Cooper has been a committed partner with its eye on economic development for the Myrtle Beach area and the entire state.

"Santee Cooper's mission is to improve the quality of life for the citizens of South Carolina," Bennett said. "ITAP is certainly one of the most important projects in Horry County. But the great thing about the aerospace industry is it's a tightknit community, and with projects like ITAP, word is getting out to the industry about how great a place South Carolina and Horry County are for business."

Bennett mirrored Lofton's statements regarding the need for diversity in the economy and also emphasized that recruiting new industry ultimately benefits Santee Cooper customers along the Grand Strand by helping to level the ups and downs of the tourism trade.

The recruitment efforts are currently ongoing with many of ITAP's partners doing their share to attract aerospace and technology companies to the area.



“We don’t believe now is the time to sit back and wait for the phones to ring. Instead, we’re being very aggressive,” said Lofton. “Our team is canvassing the country for aviation leads. We’re attending trade shows, calling suppliers and inviting aviation developers to view the project in person. We’ve got the best asset along the East Coast and we’re telling our story.”

By working together, the partners have high expectations for the future success of ITAP and are excited about the possibilities the project will bring to the area.

“We’re here, we’re ready and we’re hopeful,” La Pier said.

In other words, the sky’s the limit. **PS**

Sam Bennett, Santee Cooper’s manager of economic development, explains how ITAP fits into the state-owned electric and water utility’s mission of improving the quality of life for the state’s citizens.



Reduce the Use:

ENERGY

MONITOR



by Phil Fail

It's like a speedometer for your home

How many of you have taken the time to figure out what mileage your car gets on the highway and around town?

You know, you mark down the mileage when you fill up your tank, then you check your odometer again at the next fill up, then divide the difference by the number of gallons it takes to refill the tank. Lucky folks have a car equipped with a computer that shows your real-time mpg. They can see that when they put the accelerator to the floor and mileage plummets... and coasting down a long steep hill sends their mpg through the roof.



It's no secret that our lives run on electricity, so what if there were a gauge or readout to show you how much electricity your family's using and what it's costing at any given point in time? Granted there's the old school method, where you read your electric meter at predetermined intervals, then calculate the use over time.

That's inconvenient at best and it doesn't really let you get down to the level where you can measure the impact of individual devices, or give you immediate feedback to

show what changes are working. Wouldn't it be great if there were a device for your home like the aforementioned odometer in their cars?

Well, now there is. It's called the Blue Line PowerCost Monitor, and it can help you learn how to best control your energy use. Santee Cooper has teamed with its manufacturer, Blue Line Innovations, to offer a \$20 rebate to Santee Cooper customers who purchase one between now and June 30, 2012.

"These monitoring devices are reasonably inexpensive, and when you adjust your



Above:
Blue Line
WiFi Bridge
connects
monitoring
from
anywhere
there's an
internet
connection.

Below:
Youngster
checking what
it costs to use
the washing
machine.



energy use based on the monitor's reports, it can pay for itself pretty quickly," says Ed Bodie, Santee Cooper's manager of retail services.

In March of 2011, Santee Cooper completed a 13-month pilot program to evaluate these real-time feedback devices in homes along the Grand Strand. The monitors make the invisible visible. They let you see electricity usages in real time. It's what we in the utility business call instantaneous feedback, and the pilot found that on average the reduction in electricity use due to the availability of instantaneous feedback is approximately 6 percent.

For an average household using approximately 23,000 kilowatt-hours per year, the reduction attributable to the real-time monitor is about 1,400 kWh. That roughly translates to \$130 per year in savings, more than enough to pay for the monitor at its suggested retail price of \$109, and that's before the rebate.

"The design is really ingenious," says Gerald Stinson, Santee Cooper's administrator of the pilot program. "It's easy to install, it just slips over the glass meter cover and tightens down with a single screw. Blue Line has excellent instructions online. They even provide videos showing installation on several different kinds of electric meters."

The PowerCost Monitor is made up of two parts: a sensor unit that attaches to your electric meter outside your home and a power-usage display inside. The sensor technology scans your power meter's activity and calculates your electricity usage. Then it wirelessly transmits the information to the easy-to-read power monitor.

After the sensor is installed, you just enter your electricity rate into the display to start seeing your power usage in real time, in dollars and cents, as well as kWhs. With a range of up to 100 feet from the sensor unit, you can place the monitor just about anywhere in your home, in the kitchen, on your nightstand or on the wall in your hallway. Now you can start watching which appliances and fixtures in your home increase your electricity usage and which changes will save you the most money. It makes it easy to save energy and money.

In addition to the rebate on the PowerCost meter, Santee Cooper and Blue Line are also offering an additional \$20 rebate on the purchase of the Blue Line WiFi Bridge. It connects the PowerCost monitor to the Internet. By using third-party software (available for free download) you can track your real-time power use data via PC or smart



This is an example of a sensor unit attached to an electric meter.

phone, wherever you are. This also opens the door to use a host of technologies that not only let you remotely monitor but also remote control your energy usage.

“These platforms offer a terrific layer of engagement options for consumers,” says Peter Porteous, CEO of Blue Line Innovations. “It allows the homeowner to start out with a terrific suite of free data presentation options and then move to integrating and remotely managing heating and cooling, water heaters and other key systems in their homes.”

With the ability to remotely control various energy-driven systems at your home, you will have to pony up extra for some gadgets, including WiFi accessible thermostats and load controllers, but once online they allow you to shape your energy use to your lifestyle.

These tools also allow users to set alerts and notifications via email and text messages. Let's say you are serious about saving energy so you've set a monthly budget for your kWh consumption. You can configure the program to send you a text or email message when it looks like your projected energy costs are going to exceed your monthly budget. Some also offer useful configurations for customers taking advantage of Santee Cooper's time-of-use rate by notifying users when they are close to moving into the higher rate tier.

Here at Santee Cooper we even have one PowerCost Monitor on the system that's the focus of a friendly competition. Each summer a new crop of Santee Cooper Environmental Interns invade the same house. Last year this group of college juniors and seniors was the inaugural class for the BlueLine Challenge. They set a baseline of electricity use that successive Environmental Interns will be encouraged to match or lower.

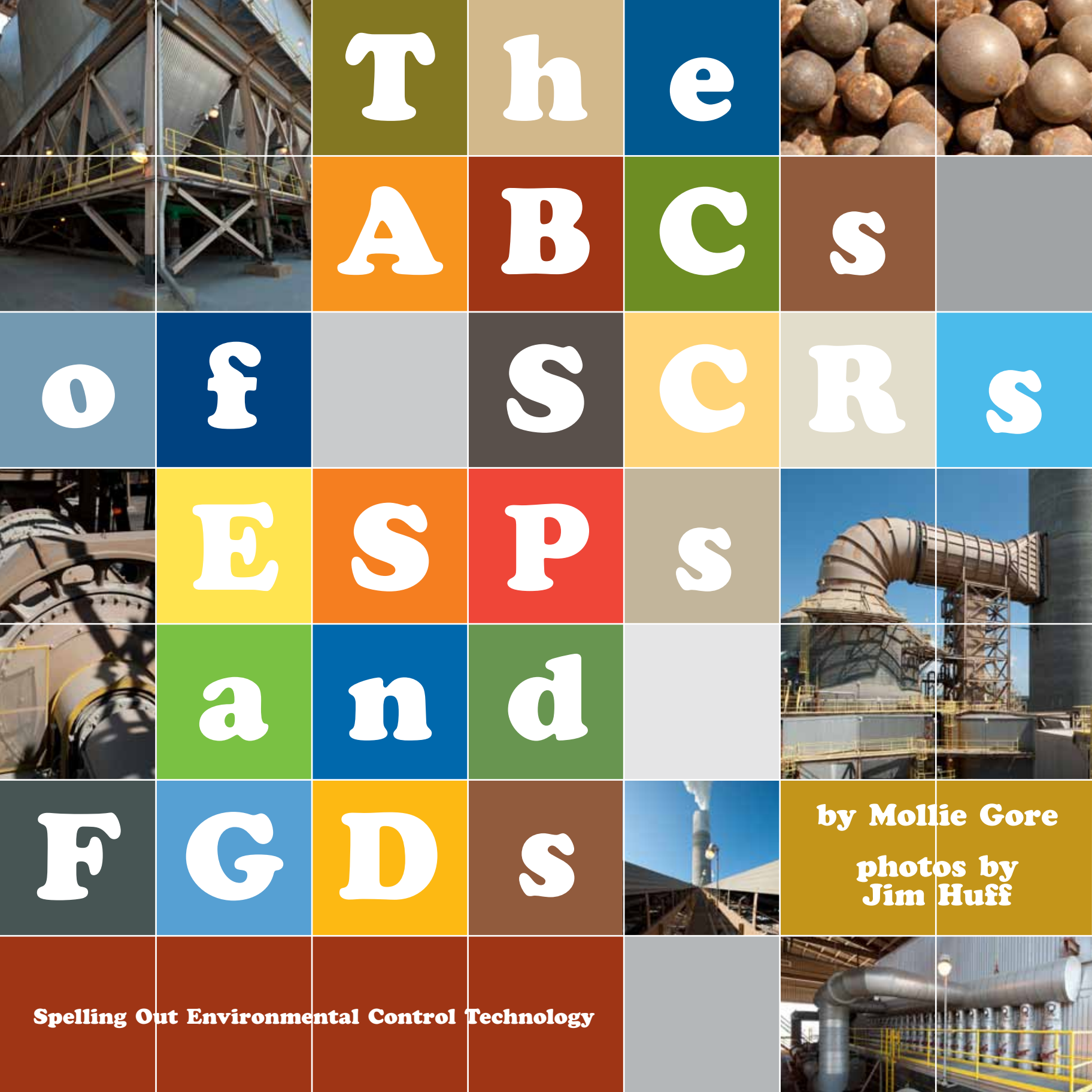
Keep in mind the PowerCost Monitor only shows you what your electricity is costing you. Ultimately, it is up to you and your family to use this information to change your behaviors. It's another tool in our toolkit to help you reduce the use. **PS** Photographs provided by Blueline



**FOR MORE
INFORMATION:**

ReduceTheUse.com

bluelineinnovations.com



T h e

A B C s

o f S C R s

E S P s

a n d

F G D s

by Mollie Gore

**photos by
Jim Huff**

Spelling Out Environmental Control Technology

By any measure, one billion dollars is a significant investment. \$1,000,000,000. A solid commitment to a cause. Real money.

So what does \$1 billion get a utility that has steadily invested that sum since the 1970s, equipping its generating stations with the latest equipment to control emissions and minimize waste?

Perhaps, the chance to spend a big chunk of that all over again on the same units, for almost the same results.

To quote Santee Cooper President and CEO Lonnie Carter from his recent op-ed about U.S. Environmental Protection Agency regulation, “Where is the common sense?”


Santee Cooper installed its first big piece of emissions-improving equipment in 1977, a flue-gas desulfurization system (scrubber) on Winyah Unit 2. Other units quickly followed, as Santee Cooper built out its generating station in Georgetown County and began building a new generating station in Cross, in Berkeley County. A scrubber here, an electrostatic precipitator there, and pretty soon you’re talking real money.

And so as Santee Cooper engineers and analysts review the latest EPA regulations to see what those regulations will require on Santee Cooper systems, PowerSource offers this look back at what the state-owned utility has already installed.

“We started scrubbing units before it was the thing to do,” notes John Dills, group manager of station construction. “We have an excellent record of equipping our coal-fired generation with environmental control technology that was state of the art at installation, and upgrading that equipment as it warranted replacement.”

This limestone conveyor at Cross Generating Station leads to equipment that grinds the limestone before it is mixed into a slurry that helps scrub flue gas, removing sulfur dioxide.





certainly, Santee Cooper has installed equipment to comply with regulations, Dills says.

“We’ve also been good at anticipating coming regulations and going ahead with the installations because it was more cost-effective for our customers in the long run.”

And with installations that run into the hundreds of millions of dollars, that eye on cost is critical. Looking at Cross Unit 4, which came online in 2008, the total project cost was just under \$640 million. The equipment and supplies related to environmental regulations accounted for \$218 million of that – or 34 percent of the project.

Santee Cooper has eight large coal-fired generating units. These “Big Eight” include all four units at Cross Generating Station, Santee Cooper’s largest station, and all four units at Winyah Generating Station. Together, they provided close to 70 percent of the electricity Santee Cooper generated in 2011, with nearly all of the rest coming from its nuclear, natural gas stations, hydro and renewable generating stations. Santee Cooper’s oldest coal stations, Grainger and Jefferies, are typically the last units pressed into service to meet extreme customer demands.

Santee Cooper receives and stacks limestone at Cross in preparation for loading it onto the conveyor.

The Big Eight units have technology that removes 90 percent or more of substances targeted by the EPA



(clockwise from bottom left)

1) The first significant environmental control the flue gas encounters is the selective catalytic reduction system, located closest to the boiler and removing nitrogen oxide before sending the gas to the electrostatic precipitators (ESPs). **2)** These ESPs pull soot and other particulate matter out of the flue gas. The triangular-shaped containers at the bottom are the hoppers. **3)** Moving right to left in this photo, the flue gas would exit the ESPs and move toward the scrubbers.



The Big Eight units have technology that removes 90 percent or more of substances targeted by the EPA, substances that include sulfur dioxide (SO₂), nitrogen oxide (NO_x), mercury and particulate matter.

“Cross and Winyah generating stations have some of the most up-to-date technology on the market for controlling emissions,” says Julie Jordan Metts, Santee Cooper’s supervisor of air quality assessment. “Not only that, the units with the most controls, or least emissions, are typically dispatched first, which further underscores Santee Cooper’s commitment to environmental responsibility.”

Santee Cooper has increased its coal-fired generating capacity 18 percent in the last 11 years. In that same time frame, it has cut by more than half its mercury, SO₂ and NO_x emissions, by installing or retrofitting those eight large units with advanced emissions-removing equipment.

ESP is no mind game

Some practitioners of extrasensory perception claim to intercept people’s thoughts: Santee Cooper’s ESPs intercept soot and other



(clockwise from top left)

- 1) The chimney in the foreground is part of an environmental technology overhaul that also included new scrubbers added to Winyah Unit 1 and Unit 2, completed in 2007.**
- 2) The hoppers separate ash into these containers, where it is sent to ash silos and recycled into cement and other materials.**
- 3) These ports allow technicians to gather flue gas samples for emissions testing.**



particulate matter. In electric utility circles, ESP means electrostatic precipitator, and it's actually the second piece of equipment that flue gas passes through as it leaves a generating unit on its way to the stack.

First, the flue gas passes through a selective catalytic reduction system (SCR), which targets the removal of NO_x and is a second-generation system. Santee Cooper initially used low- NO_x burners and now uses a combination of both, successfully removing more than 90 percent of NO_x from flue gas.

How it works: the flue gas is treated with ammonia, which sets off a chemical reaction as it passes through a catalyst, or filter. That chemical reaction removes the NO_x .

The flue gas moves then to the ESP, which removes more than 99 percent of soot and other particulate matter from the stream. The ESP works by statically charging particles which collect on large metal plates. Periodically, these plates are rapped to allow the particles to drop into collecting hoppers at the base of the precipitator. That particulate matter is known as fly ash. Fly ash is recycled as a raw material for construction applications including cement. Although most Santee Cooper fly ash is recycled, the utility operates fully permitted landfills on site for leftover fly ash.

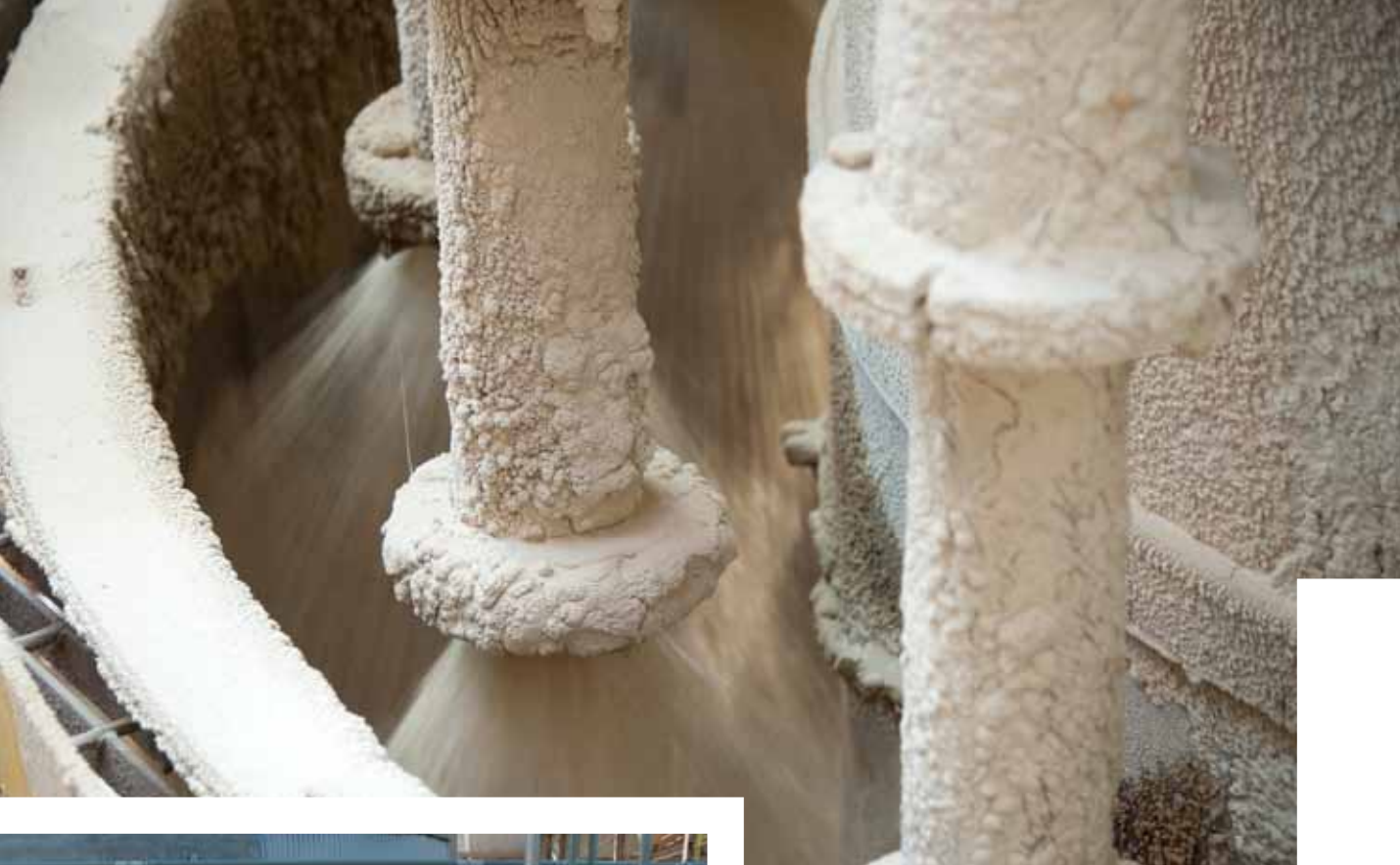
The third step in treating flue-gas is the flue-gas desulfurization (FGD), which scrubs the flue-gas for SO_2 . It also creates another recyclable byproduct with good beneficial applications: gypsum.

Santee Cooper uses wet FGD scrubbers. The magic happens in a large metal or tiled vessel, where water and limestone are mixed into a slurry that then attracts the SO_2 .

Top: a truck loads fly ash from the silos for transport to a cement manufacturer.

Bottom: The spider-like arms leaving the scrubber are recirculating pumps for the limestone slurry used to scrub the flue gas.





“We add, then, a forced oxidation process to our system to create synthetic gypsum, another plus in our flue gas scrubbing,” Metts says. “It’s optional, but it helps us meet our goals to reduce landfilling and reduce costs associated with landfilling. We recycle that gypsum as a key ingredient in wallboard, and it is also reused as an additive with agricultural applications.”

American Gypsum actually opened a plant beside Santee Cooper’s Winyah Generating Station in 2008 to receive synthetic gypsum. It is used to manufacture wallboard.

The amount of SO_2 scrubbed from the flue gas varies a little, unit by unit, depending on the age of the scrubber and the sulfur content of the coal being used, Metts said. “Cross 3 and 4 have the most up-to-date pollution control technology. Our scrubbers average 90 to 95 percent SO_2 removal, with some reaching as high as 98 or 99 percent depending on several factors.”

Santee Cooper upgrades its scrubbers as changes are made to the generating units, as required by EPA. Cross Unit 4 is the utility’s newest generating unit, and it features the most modern suite of environmental controls on the market.



Top: This wide angle view shows the scrubbers for Cross units 3 and 4 as they tie into the stack.

Bottom: A close-up of the equipment used to grind the limestone into a finer ingredient for scrubber slurry.



Mercury removal

Mercury is the chief metal targeted in EPA's December air emissions rule, the Mercury and Air Toxics Standard (MATS). EPA already regulated mercury through another rule, but MATS raised the ante. And the cost.

"Mercury is a metal found in trace amounts in the fuel we use to generate electricity," Metts says. The mercury emitted from power plants is measured as three forms: elemental (Hg_0), oxidized (Hg_{12}), and condensed on ash particles (Hg_p) and is removed through the ESPs and across the SCR and scrubbing process. "That's why our combination of emissions-control technologies is effective."

The scrubbers would remove mercury anyway, Metts says, but the SCRs actually condition the flue gas, priming the mercury for more thorough control. There



Top: This gypsum pile is headed for American Gypsum, which uses it to make wallboard.

Bottom: This truck is carrying a load of gypsum destined for agricultural reuse.



are chemical changes involved, the process is complicated, and mercury is tough to measure anyway in such small quantities, but the end result is a better than 90 percent removal at all of Santee Cooper's "Big Eight" units.

At Cross Units 3 and 4, Santee Cooper's newest coal-fired generating units, the technology trio team up to typically remove 93 percent of flue gas mercury. And yet, MATS limits are marginally higher – requiring removal of 95 percent of mercury. The big unknown is how many millions of dollars Santee Cooper will have to spend now for that marginal improvement of another 2 percent.

"We are still looking at the rule, which is lengthy and complicated," says Metts, whose group is working with Dills' station construction group in evaluating the best path forward. "The solutions will vary unit by unit and could include additives and additional equipment. And we will probably have to build new scrubbers on some units."

These retrofits for marginal improvement are especially burdensome for Santee Cooper customers, Metts says. "It's frustrating, to spend money to meet one set of rules and then have the criteria change. Generating electricity is a marathon, with the planning and permitting, the construction and then the operation of a unit. Imagine running a marathon where the finish line keeps moving farther out." **PS**

Environmental Control Technology Trivia

In terms of real estate, environmental control equipment takes up more than half of the acreage needed for a unit, not counting the coal, limestone and gypsum storage piles.

A scrubber, which removes sulfur dioxide, takes up about the same footprint as the boiler (approximately 20,000 square feet each for a 600-megawatt unit like Cross 4. That's about one-third the size of a football field).

The SCR, which removes nitrogen oxide, utilizes a footprint half as big as the boiler.

The scrubber on Cross 4 cost \$30 million. The turbine cost \$42 million.

Environmental costs accounted for 34 percent of the total cost to build Cross Unit 4.

Santee Cooper has spent \$1 billion on environmental control equipment to date, with operations and maintenance of the program costing about \$165 million a year.

The upgrades and installations required by the EPA's MATS rule will cost hundreds of millions of dollars more, for only marginal emissions controls beyond what Santee Cooper's units already achieve.

EPA: The Cost of Compliance

In December 2011, the Environmental Protection Agency released its Mercury and Air Toxics Standard (MATS), the most expensive regulation it has ever promulgated for electric utilities.

Santee Cooper is still analyzing the MATS rule to determine precise requirements for compliance, but it is expected to cost customers hundreds of millions of dollars.

An increasingly high percentage of the cost of electricity is driven by government regulations. Existing EPA regulations have already cost our customers \$1 billion in environmental equipment, with an additional \$165 million in annual operating costs. That does not count the costs of MATS.

The EPA has other proposed regulations in the works which will only add to the cost of environmental compliance for energy customers, both for power nationwide.

Stay up to date by clicking on “Energy Matters” at www.santeecooper.com.

MATS

Although we are still analyzing it, the MATS rule may force us to close or curtail some of our generation at our oldest and smallest units. These are units that are only used to meet peak demand loads, and yet it may be physically or economically impractical to make the upgrades the EPA is requiring.

Santee Cooper has an excellent environmental record and has led South Carolina in voluntarily installing environmental control technology. Our largest units already capture 93 percent of emissions targeted by the MATS rule.



Other EPA regulations

EPA is also considering regulations that could declare combustible byproducts as hazardous waste and affect carbon dioxide emissions and water cooling in electrical generation.

We currently recycle up to 90 percent of our combustible byproducts. They are not hazardous as defined by federal regulations. If they are added to that classification, it could effectively kill our recycling programs and force us – and other utilities – to landfill these ash and other byproducts.

Regarding carbon dioxide emissions, there is currently no proven technology available to successfully address carbon capture. Santee Cooper is funding clean-coal research that we hope will move us towards an answer. Until there is a proven solution, we oppose attempts to force carbon emissions control at utility scale.

Finally, EPA is considering designating cooling towers as the “best available” technology to cool water that is warmed during the coal-fired generation process and then returned to the environment. Santee Cooper has cooling towers in some locations and other technology, which does not adversely impact the environment, in other stations. EPA should allow for site-specific controls to address cooling water.

Grand Strand Powers...electric vehicles

Santee Cooper is offering electricity to electric charging stations in Horry County.

by Myles Jackson

Last November, the newest of these stations opened at Coastal Carolina University (CCU) with officials from Plug In Carolina, CCU, the Myrtle Beach Chamber of Commerce and Santee Cooper on hand to demonstrate. The two CCU stations are among nine that have been installed in Horry County. It is the latest effort in an initiative to build a more energy-sustainable community in the Grand Strand. The other stations are spread from North Myrtle Beach to Conway and Surfside Beach.

“Coastal Carolina University is excited about the continuing partnership with Santee Cooper to provide electric vehicle charging stations on our campus,” said Stevie A. Bowie, Coastal Carolina’s vice president and chief financial officer. Brad Dean, president and CEO of the Myrtle Beach Area Chamber of Commerce added, “We are seeing businesses throughout our community jump on board to promote different ‘green’ initiatives as they employ more environmentally friendly practices in their day-to-day operations and believe that this sort of sustainable business strategy is an all-around good approach.”

Santee Cooper helped Plug-In Carolina secure locations in the Grand Strand region, focusing on parking areas that are publicly accessible and could accommodate a station. The charging stations will increase the comfort level of electric vehicle drivers by providing opportunities to “top off” a charge during the day, although Santee Cooper will continue to promote the importance of off-peak charging as the primary practice for electric vehicle owners. Santee Cooper is providing electricity free of charge to help raise awareness of good charging habits.



Contract signed with Green Energy Solutions

Santee Cooper's board of directors has approved a contract with Green Energy Solutions (GES) for up to 25 megawatts of electricity generated from renewable resources in South Carolina.

Alabama-based GES will in turn execute agreements with individual farms to produce the 25 MWs. The fuel source gained from these farms will be biogas produced through anaerobic digestion of poultry, swine, cow and other organic agricultural waste.

Santee Cooper now has more than 200 MWs of renewable electricity generation already online or under contract, using sustainable South Carolina resources including landfill gas, biogas, solar energy and wind energy. One MW can power about 500 average South Carolina homes.

Lower electricity rate for new or expanding industries announced

Utilities whose systems make up the largest electric power system in South Carolina recently announced a new, lower electric rate designed to attract jobs and industrial expansion to the state.

Santee Cooper and 20 independent, member-owned electric cooperatives together provide power in all 46 counties in the state.

The economic development rate is for new or expanding industries and could result in initial savings of as much as

20 percent on electricity costs to an industry, depending on the size and characteristics of the electric load. For example, a plant operating on three work shifts (24 hours) would benefit more than a plant operating only one shift.

An emphasis on industrial growth by Santee Cooper and the cooperatives is particularly important because they provide power to much of the areas where expansion is likely to take place: rural and suburban areas. The rate is available until Dec. 31, 2014.

Santee Cooper customers give utility high satisfaction marks in 2011

Santee Cooper's annual customer satisfaction survey indicates residential customers are significantly more satisfied with Santee Cooper than are customers of other South Carolina and national utilities.

According to MarketSearch, 98.7 percent of Santee Cooper residential customers were satisfied with the state-owned utility in 2011. By comparison, the average for South Carolina utilities was 89 percent, and the national average was 89.4 percent. Santee Cooper has consistently outscored state and national averages in the annual survey.

Other highlights show near perfect scores that reflect customers' positive attitudes toward minimizing outages, reliability of service, response to customer questions and concerns, quality of power and Santee Cooper's reputation.

Frank Brown, president and CEO of MarketSearch said, "This marks the 20th year that MarketSearch has conducted

customer satisfaction studies among Santee Cooper's residential customers. Throughout this time, we have observed extraordinarily high and consistent levels of satisfaction, well ahead of national and statewide norms."

"Our employees are dedicated, diligent and committed to our customers, and this survey is a direct reflection of that commitment," said Mike Poston, vice president of retail operations. "The survey results are a testament to the caliber of employees we have working here."

Celebrate The Season Revenues Donated to Charity

The Old Santee Canal Park donated proceeds from the inaugural Celebrate The Season holiday festival to Trident United Way and the Berkeley County Museum and Heritage Center.

In a brief ceremony held at the park's Interpretive Center, Park Director Troy Diel presented checks of \$13,690 each to Trident United Way Vice President David Nicole and Carolyn Pilgrim, the museum's office manager. The proceeds were generated by ticket sales from Celebrate The Season's month long holiday lights display and weekend holiday fairs.

The festival raised \$36,596 that was donated to area charities. In addition to TUW and the museum, title sponsors chose three additional charities that received one night's worth of gate admissions, approximately \$3,000 each. The park is owned and operated by Santee Cooper. **PS**





www.santeecooper.com/energymatters